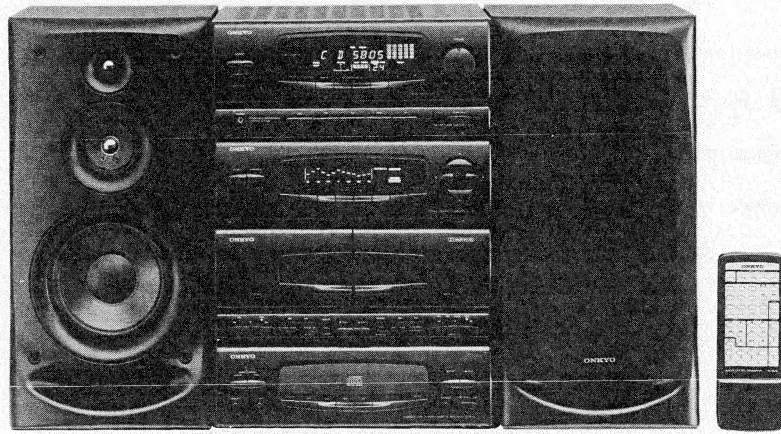


ONKYO® SERVICE MANUAL

Stereo Graphic Equalizer and Speaker Systems

MODEL EQ-31

MODEL PS-21/PS-31



Black model

MD	120V AC, 60Hz	MQ	240V AC, 50Hz
MP	230V AC, 50Hz	MW	120V/220V AC, 50Hz/60Hz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

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ONKYO
AUDIO COMPONENTS

SPECIFICATIONS

Input:	Input sensitivity (FLAT): 150mV
	Input impedance: 50kohms
Output:	Output voltage (FLAT): 150mV
	Output impedance: 1.0kohms
Max. input:	5 volts, 1kHz, 0.05% THD
Frequency response:	20Hz – 20kHz (+0, –0.5dB)
Total harmonic distortion:	Less than 0.05% at 20Hz-20kHz, 1.5V output (FLAT)
Signal to noise ratio:	100dB, 1.5V output, IHF-A input short
Adjustable range:	±12dB
Gain:	0dB
Power supply:	
	European models
	AC 230V, 50Hz
	U.S.A. and Canadian models
	AC 120V, 60Hz
	Australian models
	AC 240V, 50Hz
	Worldwide models
	AC 120 and 220V switchable, 50/60Hz
Dimensions:	275 (W) × 85 (H) × 300 (D) mm 10-7/8" × 3-3/8" × 11-13/16"
Weight:	2.7kg (6.0lbs.)

Design and specifications are subject to change without prior notice.

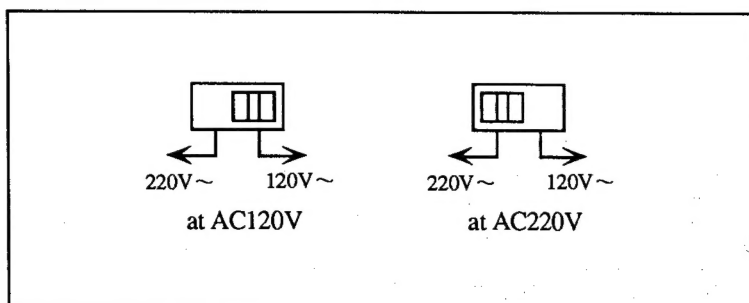
PRECAUTIONS

1. Insulation resistance measurement (Only U.S.A. model)

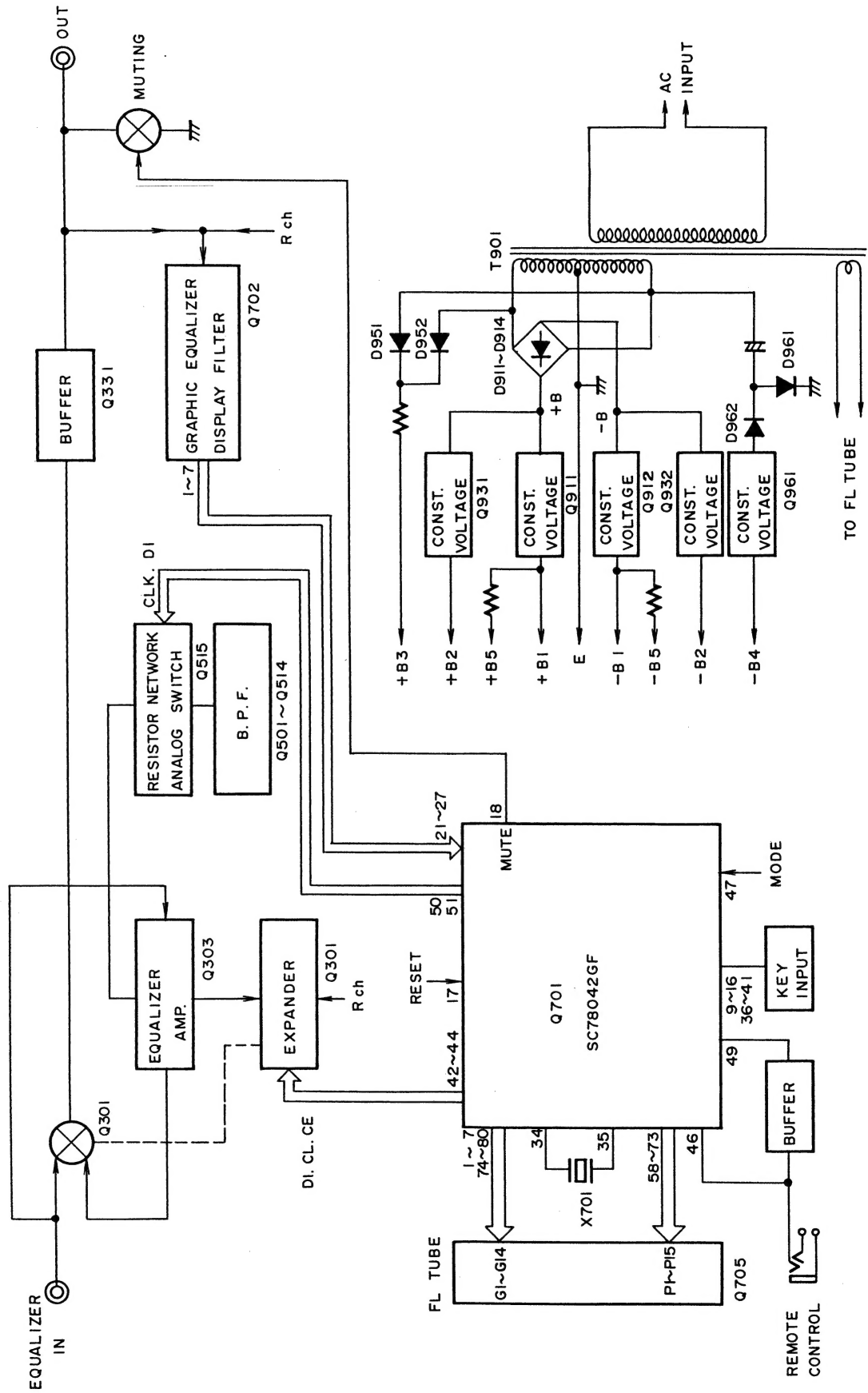
Connect the insulating-resistance tester between the plug of power supply cable and terminal GND on the back panel. Specifications; More than 10 MΩ at 500V.

2. Voltage Selector (Rear Panel)

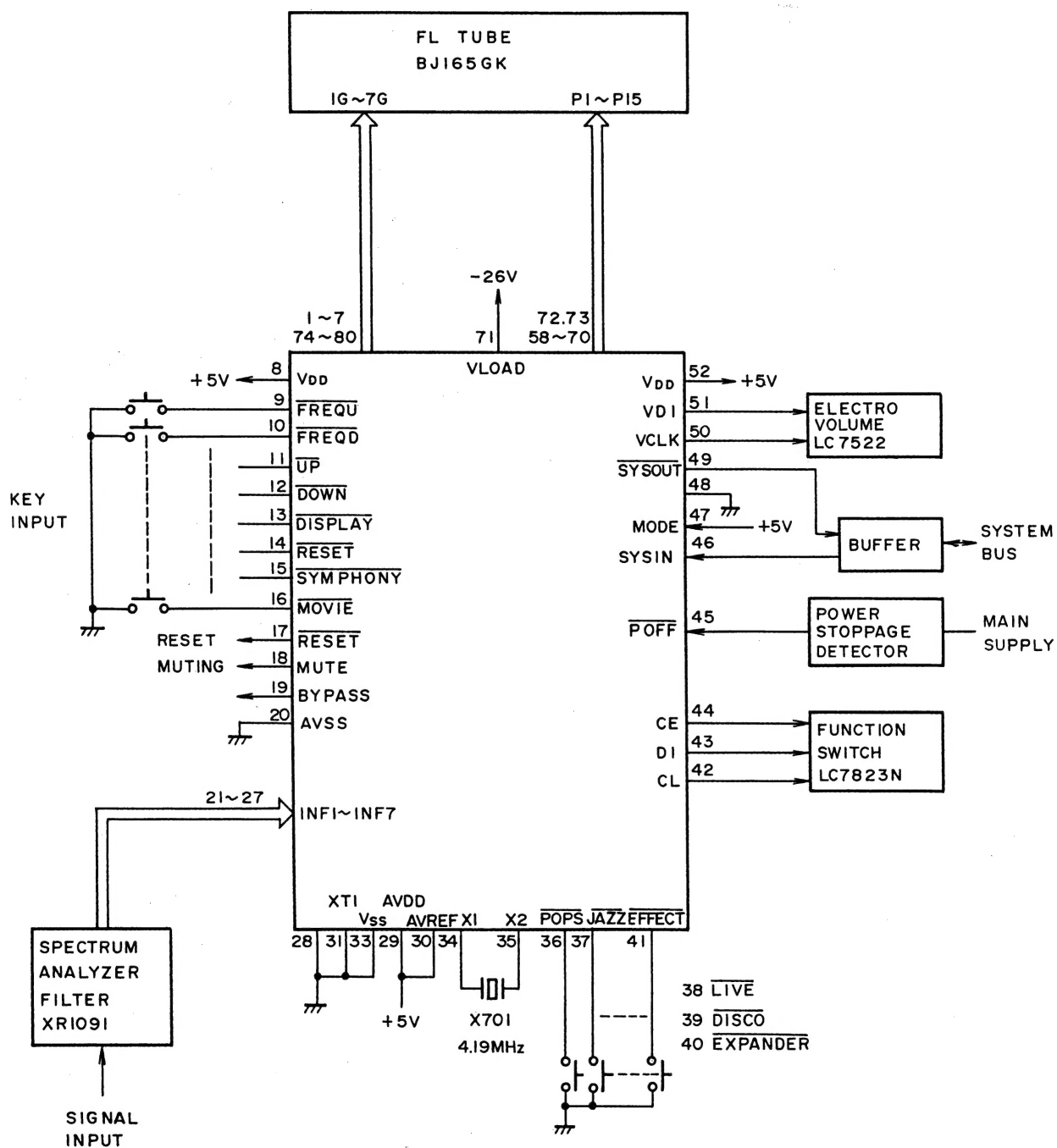
Worldwide models are equipped with a voltage selector to conform with local power supplies. Be sure to set this switch to match the voltage of the power supply in your area before plugging in the unit. The voltage is changed by inserting a screw driver into the groove of the switch, and moving the switch from the right or left. Confirm that the switch has been moved all the way to the right or left before plugging in the unit. Models without a voltage selector can only be used in areas where the power supply is the same as that of the unit.



BLOCK DIAGRAM



IC BLOCK DIAGRAM

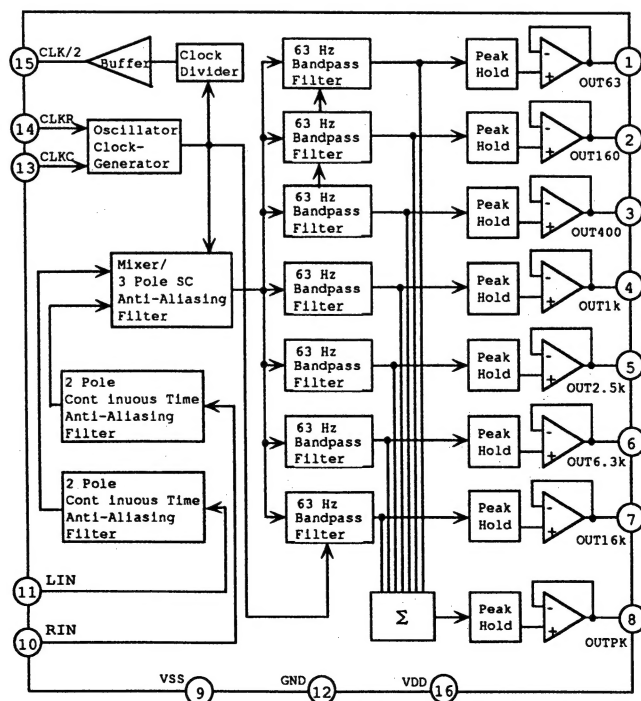
 μ PD78042GF(Microprocessor)

μ PD78042GF

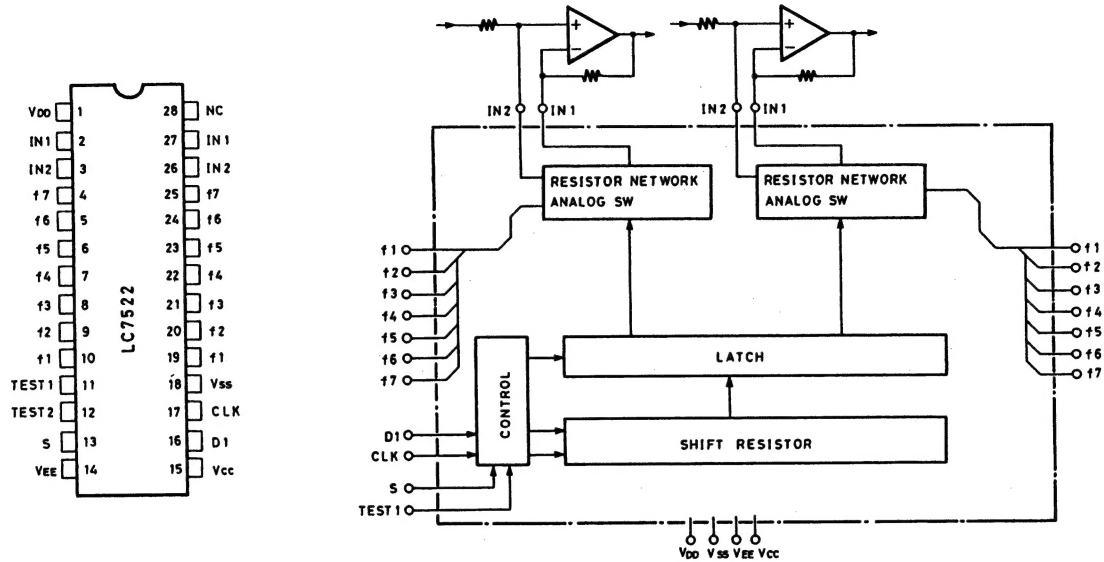
Pin No.	CODE	FUNCTION	I/O	DESCRIPTION
1	FIP6	7G	OUT	Output terminal for Digit
2	FIP5	6G	OUT	
3	FIP4	5G	OUT	
4	FIP3	4G	OUT	
5	FIP2	3G	OUT	
6	FIP1	2G	OUT	
7	FIP0	1G	OUT	
8	VDD	VDD	----	Power (+5V) connecting terminal
9	SCK0	$\overline{\text{FREQU}}$	IN	Key input terminal
10	S00/SB1	$\overline{\text{FREQD}}$	IN	
11	SI0/SB0	$\overline{\text{UP}}$	IN	
12	BUSY	$\overline{\text{DOWN}}$	IN	
13	STB	$\overline{\text{DISPLAY}}$	IN	
14	SCK1	$\overline{\text{RESET}}$	IN	
15	SO1	$\overline{\text{SYMPHONY}}$	IN	
16	SI1	$\overline{\text{MOVIE}}$	IN	
17	RESET	$\overline{\text{RESET}}$	IN	Reset input terminal
18	P74	MUTE	OUT	Muting output terminal
19	P73	BYPASS	OUT	Control output terminal for Bypass. Not used
20	AVSS	AVSS	----	Ground terminal of A/D converter
21	AN17	INF1	IN	Analog input terminal for A/D Converter
22	AN16	INF2	IN	
23	AN15	INF3	IN	
24	AN14	INF4	IN	
25	AN13	INF5	IN	
26	AN12	INF6	IN	
27	AN11	INF7	IN	
28	AN10	-----	----	Not used. To be connected with GND.
29	AVDD	AVDD	----	Power (+5V) terminal for A/D converter
30	AVREF	AVREF	----	Reference voltage (+5V) for A/D converter
31	XT1	XT1	----	Not used
32	XT2	XT2	----	Not used
33	VSS	VSS	----	Ground terminal
34	X1	X1	----	Ceramic resonator connection terminal for the main system clock. Connect the ceramic resonator 4.19 MHz
35	X2	X2	----	
36	P37	$\overline{\text{POPS}}$	IN	Key input terminal
37	BUZ	$\overline{\text{JAZZ}}$	IN	
38	PCL	$\overline{\text{LIVE}}$	IN	
39	T12	$\overline{\text{DISCO}}$	IN	
40	T11	$\overline{\text{EXPANDER}}$	IN	
41	T02	$\overline{\text{EFFECT}}$	IN	Connect to the terminal CL of Analog switch
42	T01	FCL	OUT	
43	T00	FDI	OUT	
44	INTP3/CI0	FCE	OUT	
45	INTP2	$\overline{\text{POFF}}$	IN	Input terminal for detecting power suspension
46	INTP1	SYS IN	IN	System code input terminal
47	INTP0/TI0	MODE	IN	Initializing input terminal
48	IC	IC	----	To be connected with Ground
49	P72	$\overline{\text{SYS OUT}}$	OUT	Output terminal for system code

Pin No.	CODE	FUNCTION	I/O	DESCRIPTION
50	P71	VCLK	OUT	Output terminal to be connected with CLK terminal of Electron volume
51	P70	VD1	OUT	Output terminal to be connected with DI terminal of Electron volume
52	VDD	VDD	----	Power (+5V) terminal
53	FIP33	----	----	Not used
54	FIP32	----	----	
55	FIP31	----	----	
56	FIP30	----	----	
57	FIP29	----	----	
58	FIP28	P15	OUT	Output terminal for Segment
59	FIP27	P14	OUT	
60	FIP26	P13	OUT	
61	FIP25	P12	OUT	
62	FIP24	P11	OUT	
63	FIP23	P10	OUT	
64	FIP22	P9	OUT	
65	FIP21	P8	OUT	
66	FIP20	P7	OUT	
67	FIP19	P6	OUT	
68	FIP18	P5	OUT	
69	FIP17	P4	OUT	
70	FIP16	P3	OUT	
71	VDD	VLOAD	----	Power (-26V) connecting terminal
72	FIP15	P2	OUT	Output terminal for Segment
73	FIP14	P1	OUT	
74	FIP13	14G	OUT	Output terminal for Digit
75	FIP12	13G	OUT	
76	FIP11	12G	OUT	
77	FIP10	11G	OUT	
78	FIP9	10G	OUT	
79	FIP8	9G	OUT	
80	FIP7	8G	OUT	

XR1091ECP (Graphic Equalizer Display Filter)

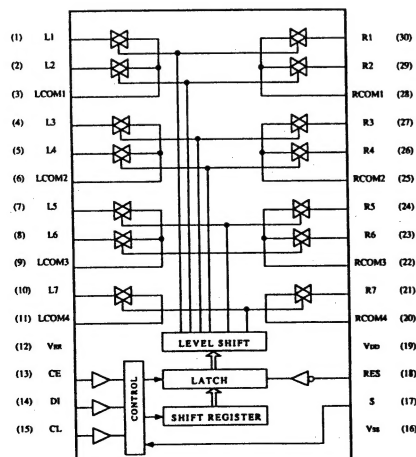


LC7522 (Electro Volume)



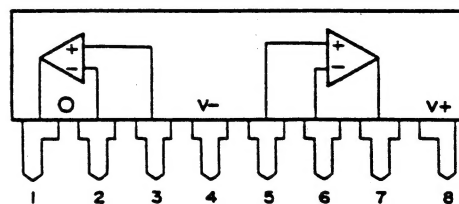
Pin no.	Symbol	Description
1	V _{DD}	Power supply (+7V) connecting terminal
18	V _{SS}	Ground (0V) connecting terminal
14	V _{EE}	Power supply (-7V) connecting terminal
15	V _{CC}	Power supply (-5V) connecting terminal
16	D1	Data input terminal
17	CLK	Clock input terminal Schmidt inverter type
2, 27 3, 26	IN1 IN2	Sound input terminal OP Amplifier connecting terminal
4~10 19~25	f1 ~ f7	Band filter connecting terminal
13	S	Chip Select terminal
11 12	TEST1 TEST2	Test terminal OPEN

LC7823N (Analog Switch)

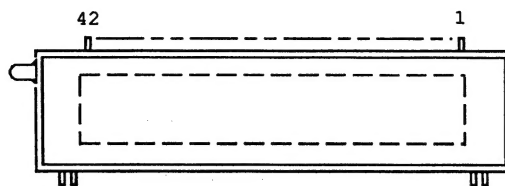


BA15218N

NJM4580LD (OP Amp.)



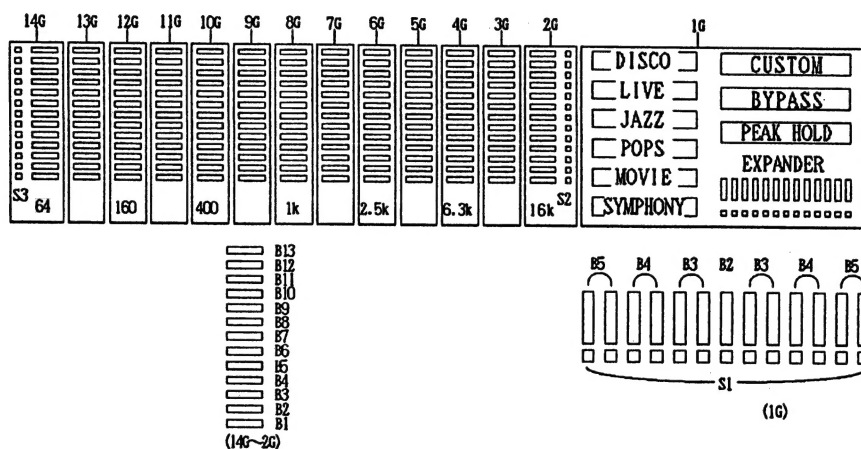
BJ165GK (Fluorescent Indicator Tube)



PIN CONNECTION

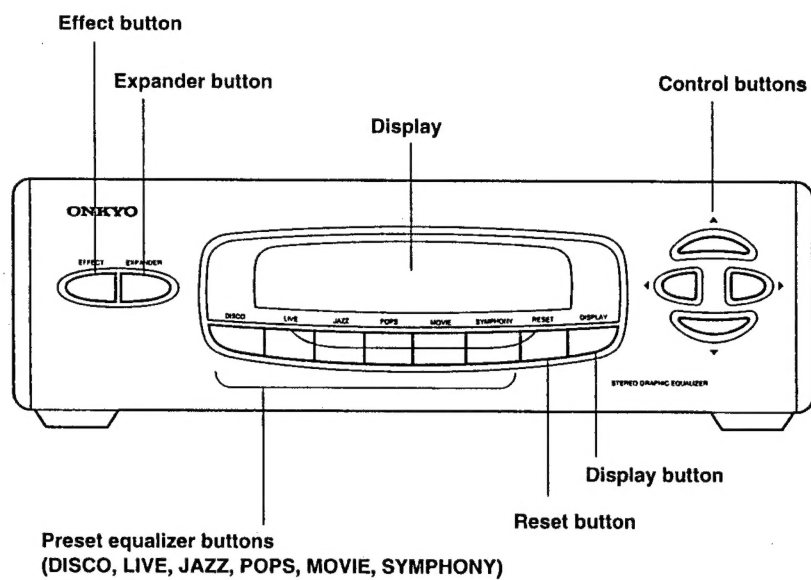
PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CONNECTION	F1	F1	NP	NP	1G	2G	3G	4G	5G	6G	7G	8G	9G	10G	11G
PIN NO.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
CONNECTION	12G	13G	14G	NC	NC	NC	NC	NC	P1	P2	P3	P4	P5	P6	P7
PIN NO.	31	32	33	34	35	36	37	38	39	40	41	42			
CONNECTION	P8	P9	P10	P11	P12	P13	P14	P15	NP	NP	F2	F2			

NOTE 1) F1, F2 --- Filament 3) NC ----- No connection
 2) NP ----- No pin 4) 1G~14G -- Grid

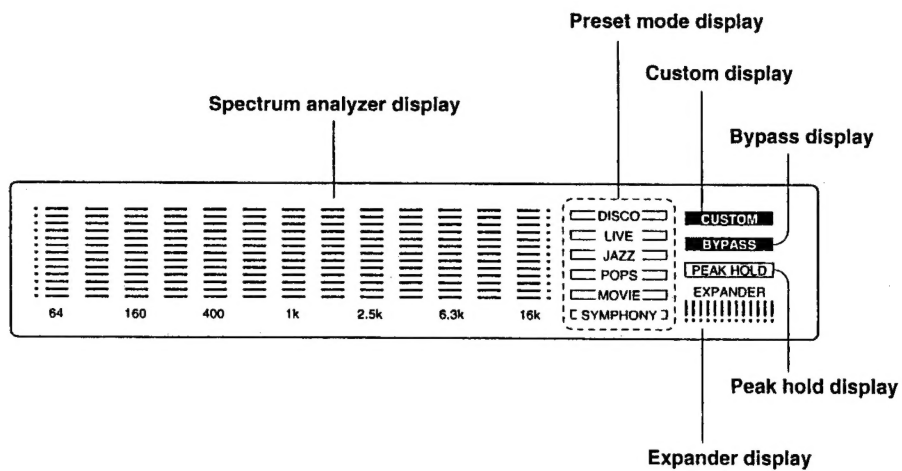


	14G	13G	12G	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
P1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	S1
P2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2
P3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3
P4	B4	B4	B4	B4	B4	B4	B4	B4	B4	B4	B4	B4	B4	B4
P5	B5	B5	B5	B5	B5	B5	B5	B5	B5	B5	B5	B5	B5	B5
P6	B6	B6	B6	B6	B6	B6	B6	B6	B6	B6	B6	B6	B6	EXPANDER
P7	B7	B7	B7	B7	B7	B7	B7	B7	B7	B7	B7	B7	B7	PEAK HOLD
P8	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8	BYPASS
P9	B9	B9	B9	B9	B9	B9	B9	B9	B9	B9	B9	B9	B9	CUSTOM
P10	B10	B10	B10	B10	B10	B10	B10	B10	B10	B10	B10	B10	B10	SYMPHONY
P11	B11	B11	B11	B11	B11	B11	B11	B11	B11	B11	B11	B11	B11	MOVIE
P12	B12	B12	B12	B12	B12	B12	B12	B12	B12	B12	B12	B12	B12	POPS
P13	B13	B13	B13	B13	B13	B13	B13	B13	B13	B13	B13	B13	B13	JAZZ
P14	S3	-	-	-	-	-	-	-	-	-	-	-	S2	LIVE
P15	64	-	160	-	400	-	1K	-	2.5K	-	6.3K	-	16K	DISCO

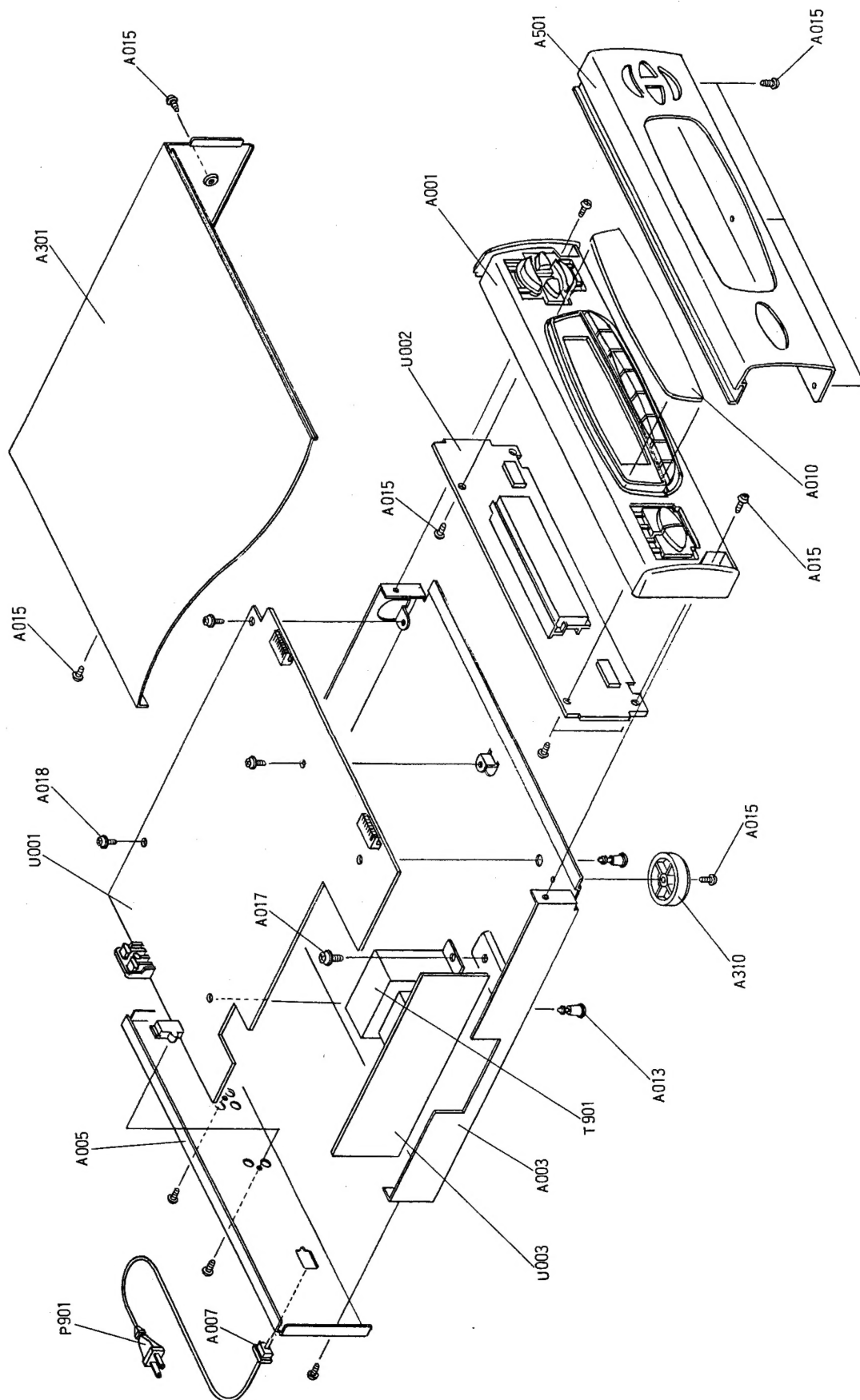
FRONT PANEL FACILITIES



Display



CHASSIS-EXPLODED VIEW



CHASSIS EXPLODED VIEW PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	
A001	27110771AY	FRONT BRACKET	
A003	27100269Y	CHASSIS	
A005	27121751Y	REAR PANEL [D]	
A005	27121752AY	REAR PANEL [P]	
A005	27121753AY	REAR PANEL [W]	
A005	27121754AY	REAR PANEL [Q]	
A007	27300750	CORD BUSHING	
A010	28191658Y	CLEAR PLATE	
A013	27190428A	KGLS-10RT, HOLDER	
A015	834430088	3TTS+8B (BC), SCREW	
A017	830440089	4TTC+8C (BC), SCREW	
A018	831130088	3TTW+8B, SCREW	
A301	28184543Y	COVER	
A310	271752521Y	LEG	
A501	27211525	FRONT PANEL	
△ T901	2300923Y	NPT-1178D, POWER TRANSFORMER	[D]
△ T901	2300924Y	NPT-1178P, POWER TRANSFORMER	[P]
△ T901	2300925Y	NPT-1178DG, POWER TRANSFORMER	[W]
△ T901	2300926Y	NPT-1178Q, POWER TRANSFORMER	[Q]
△ P901	253173Y	AS-UC-7 #18, AC CORD [D]	
△ P901	253164Y OR	AS-CEE OR	
	253175Y	AS-CEE, AC CORD [P, W]	
△ P901	253170	AS-SAA, AC CORD [A]	
U001	1W112563-1	NAAF-4763-1, MAIN CIRCUIT PC BOARD ASS'Y [D]	
U001	1W112563-1A	NAAF-4763-1A, MAIN CIRCUIT PC BOARD ASS'Y [P,W,Q]	
U002	1W112564-1	NADG-4764-1, MICROPROCESSOR PC BOARD ASS'Y	
U003	1W112565-1	NAPS-4765-1, POWER SUPPLY CIRCUIT PC BOARD ASS'Y [D]	
U003	1W112565-1A	NAPS-4765-1A, POWER SUPPLY CIRCUIT PC BOARD ASS'Y [P, Q]	
U003	1W112565-1B	NAPS-4765-1B, POWER SUPPLY CIRCUIT PC BOARD ASS'Y [W]	
U004	1W112566-1	NASW-4766-1, SLIDE SWITCH CIRCUIT PC BOARD ASS'Y [W]	

NOTE: [D] : 120V model only
[P] : 230V model only
[W] : Worldwide model only
[Q] : 240V model only
[A] : Australian model only

NOTE:
THE COMPONENTS IDENTIFIED BY MARK △ ARE
CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK.
REPLACE ONLY WITH PART NUMBER SPECIFIED.

PACKING PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
A851	29091631Y	PAD (E)
A852	29095712Y	SHEET
A853	261504Y	PAPER TAPE
	29360778Y	LABEL (FLASH) [N]

NOTE: [N]: U.S.A. model only

PRINTED CIRCUIT BOARD – PARTS LIST

MAIN CIRCUIT PC BOARD (NAAF-4763-1, -1A)

CIRCUIT. NO.	PART NO.	DESCRIPTION
ICs		
Q301	22240339	LC7823N
Q302,Q303	22240293 or	NJM4558L-D or
Q331	22240247	BA15218N
Q515	22240219	LC7522
Q911	222780125	78M12HF
Q912	222790125	79M12HF
Q931	222780565JRC	78M56
Q932	222790055	79M05FA
Transistors		
Q501-Q514	2213284	2SC1740S-R
Q601,Q602	2213631 or	RN1241-A or
	2213632	RN1241-B
Q603	2213510	DTA114ES
Q961	2213354	2SA933S-R
Diodes		
D201-D601	223205	223205Y or
	223163	1SS133
D911-D914	22380046 or	AM01Z or
	22380035	GP104003E
D931	223205 or	1SS270A or
	223163	1SS133
D941,D942	224450683	MTZ6.8C
D951,D952	22380046 or	AM01Z or
	22380035	GP104003E
D953	224450512	MTZ5.1B
D961,D962	22380046 or	AM01Z or
	22380035	GP104003E
D963	224452704	MTZ27D
D964	224450683	MTZ6.8C
Capacitors		
C301,C302	354780479	4.7 μ F/50V, Elect.
C307,C308	354780479	4.7 μ F/50V, Elect.
C309,C310	374722224	2200PF/50V,Film (TF)
C311,C312	374726824	6800pF/50V,Film(TF)
C313,C314	354761009	10 μ F/35V,Elect.
C315,C316	354761009	10 μ F/35V,Elect.
C321	354761009	10 μ F/35V,Elect.
C331,C332	354780479	4.7 μ F/50V,Elect.
C335,C336	354761009	10 μ F/35V,Elect.
C343	354761009	10 μ F/35V,Elect.
C501,C502	354780109	1 μ F/50V,Elect.
C503,C504	374725634	0.056 μ F/50V,Film(TF)
C505,C506	354784799	0.47 μ F/50V,Elect.
C507,C508	374724734	0.047 μ F/50V,Film(TF)
C509,C510	374721544	0.15 μ F/50V,Film(TF)
C511,C512	374722234	0.022 μ F/50V,Film(TF)

CIRCUIT. NO.	PART NO.	DESCRIPTION
C513,C514	374726834	0.068 μ F/50V,Film(TF)
C515,C516	374728224	8200pF/50V,Film(TF)
C517,C518	374722734	0.027 μ F/50V,Film(TF)
C519,C520	374723324	3300pF/50V,Film(TF)
C521,C522	374721034	0.01 μ F/50V,Film(TF)
C523,C524	374721524	1500pF/50V,Film(TF)
C525,C526	374723924	3900PF/50V,Film(TF)
C527,C528	374725615	560pF/50V,Film(TF)
C601	354761009	10 μ F/35V,Elect.
C915,C916	354762229	2200 μ F/35V,Elect.
C917,C918	354762219	220 μ F/35V,Elect.
C919,C920	354761009	10 μ F/35V,Elect.
C931,C932	354762219	220 μ F/35V,Elect.
C933,C934	354761009	10 μ F/35V,ELECT.
C941,C942	354761009	10 μ F/35V,ELECT.
C951	354762209	22 μ F/35V,Elect.
C961	354762209	22 μ F/35V,Elect.
C962	354780109	1 μ F/50V,Elect.
C963	354781019	100 μ F/50V,Elect.
C981-C984	354780479	4.7 μ F/50V,Elect.
Resistors		
R913,R914	441622204	22 Ω ,1W,Metal oxide film
R931,R932	441621014	100 Ω ,1W,Metal oxide film
R951	442522024	2k Ω ,1/2W,Metal oxide film
R952	441621024	1k Ω ,1W,Metal oxide film
R953	442521024	1k Ω ,1/2W,Metal oxide film
R962	442522204	22 Ω ,1/2W,Metal oxide film
Terminal		
P201	25045303Y	NPJ-4PDBL162
Sockets		
P701,P702	25051046Y	NSCT-10P833
Jack		
P751	25045330	NPJ-2PDBL184
Heat sink		
Q931a	27160145	

MICROPROCESSOR CIRCUIT PC BOARD (NADG-4764-1)

CIRCUIT. NO.	PART NO.	DESCRIPTION
ICs		
Q701	22240710	SC7804GF-023
Q702	22240711	XR1091ECP
Transistors		
Q703	2213284	2SC1740S-R
Q704	2213510	DTA114ES


PRINTED CIRCUIT BOARD – PARTS LIST

CIRCUIT. NO.	PART NO.	DESCRIPTION
	FL Tube	
Q705	212121	BJ165GK
	Diodes	
D701,D702	223205 or	1SS270A or
D704-D706	223163	1SS133
D707	224450562	MTZ5.6B,Zener
	Resonator	
X701	3010163	CTS4.19MGW
	Choke coil	
L711,L722	233411k220	NCH-1387
	Capacitors	
C701	3000059	0.047F/5.5V, Super
C705	354780109	1 μ F/50V, Elect.
C707	354761009	10 μ F/35V, Elect.
C711	354780479	4.7 μ F/50V, Elect.
C713,C714	374721034	0.01 μ F/50V, Film(TF)
C715	374721024	1000 pF, Film(TF)
	Switches	
S701-S714	25035548	NPS-111-S510
	Plugs	
P701,P702	25055659	NPLG-10P615
	Holder	
	27190927A	Holder(FL)


POWER SUPPLY CIRCUIT PC BOARD (NAPS-4765-1, -1A,-1B)

CIRCUIT. NO.	PART NO.	DESCRIPTION
	Jumper lead	
JL911a	25J250303HY	

SLIDE SWITCH CIRCUIT PC BOARD (NASW-4766-1)

CIRCUIT. NO.	PART NO.	DESCRIPTION
	Switch	
 S902	25065437	NSS-22157P

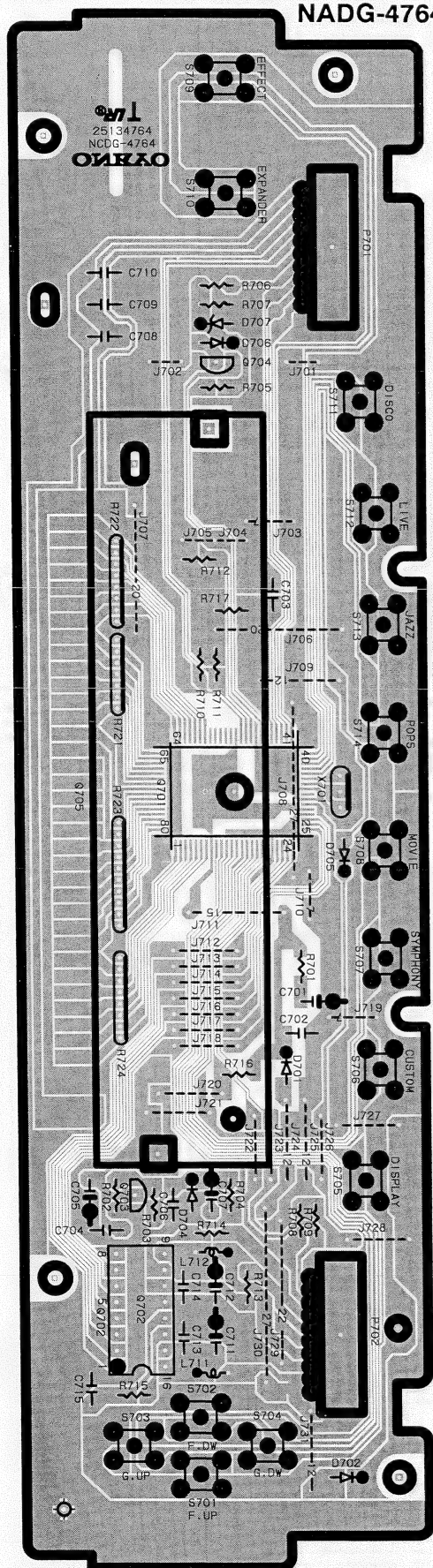
NOTE:

THE COMPONENTS IDENTIFIED BY MARK  ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE

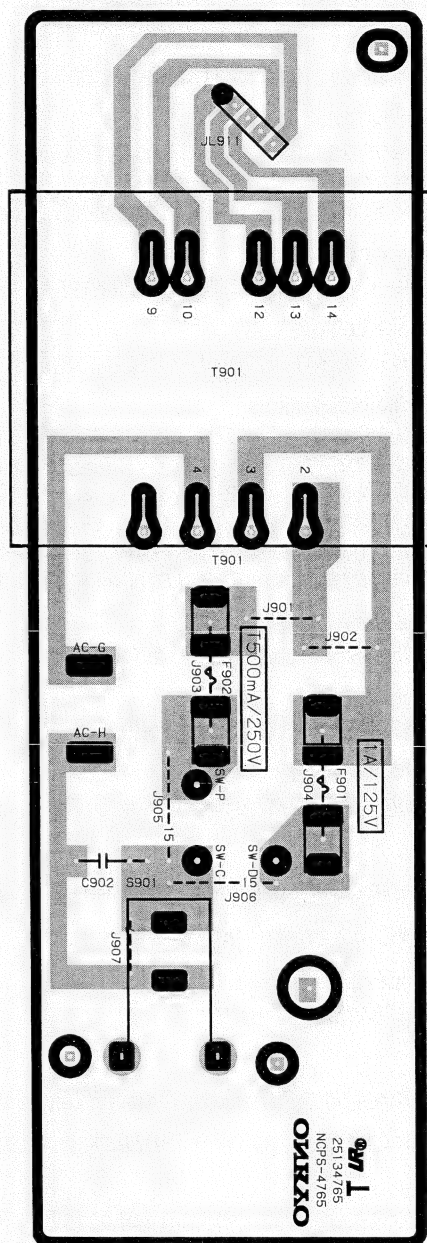
MICROPROCESSOR CIRCUIT

NADG-4764



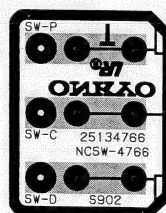
POWER SUPPLY CIRCUIT

NAPS-4765



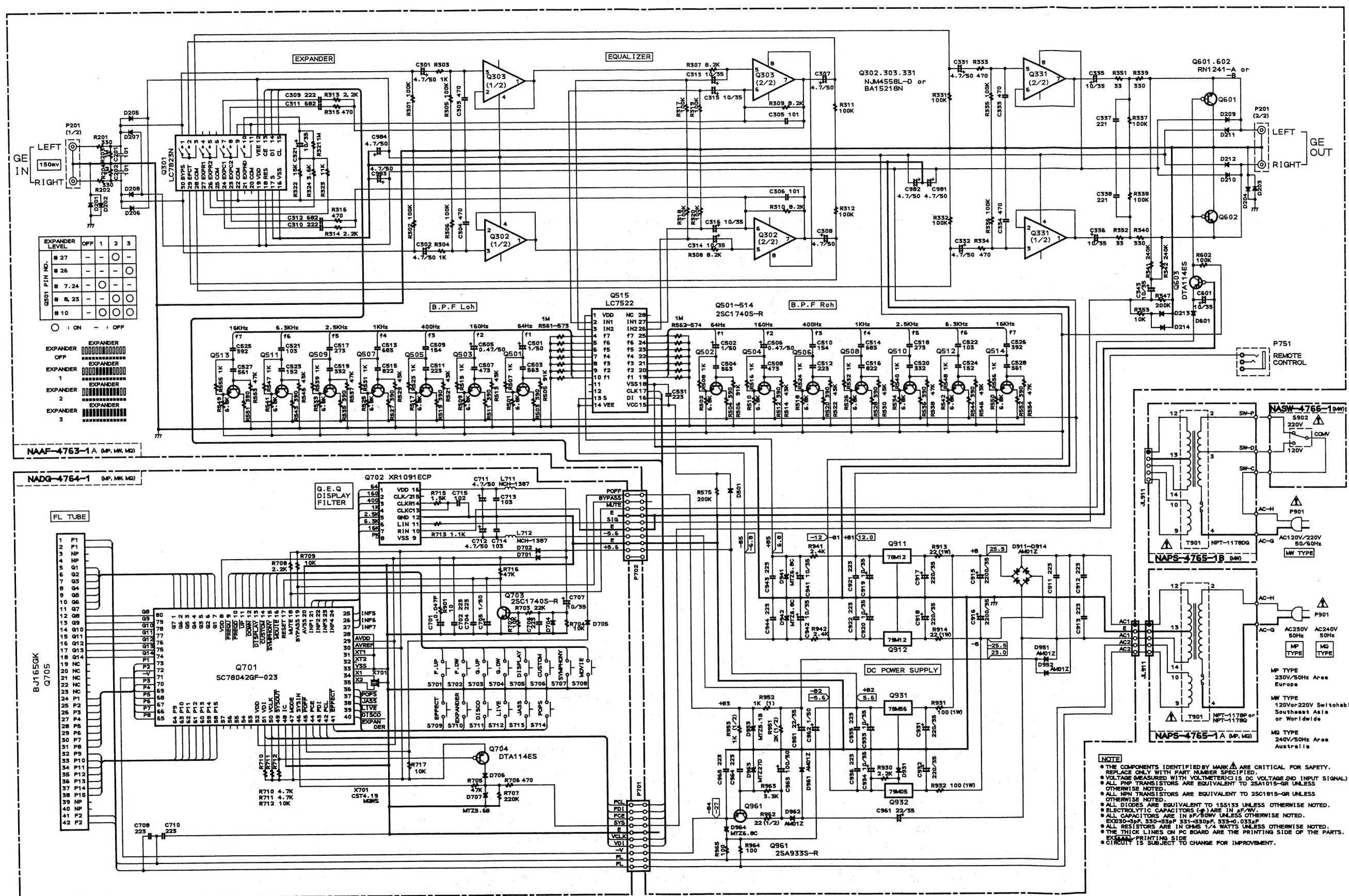
SLIDE SWITCH CIRCUIT

NASW-4766



A B C D E F G H

SCHEMATIC DIAGRAM



CIRCUIT
F-4763

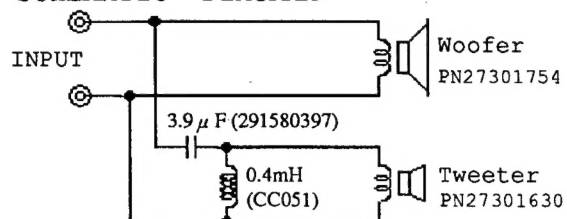
SPEAKER SYSTEM

MODEL PS-21

1. SPECIFICATIONS

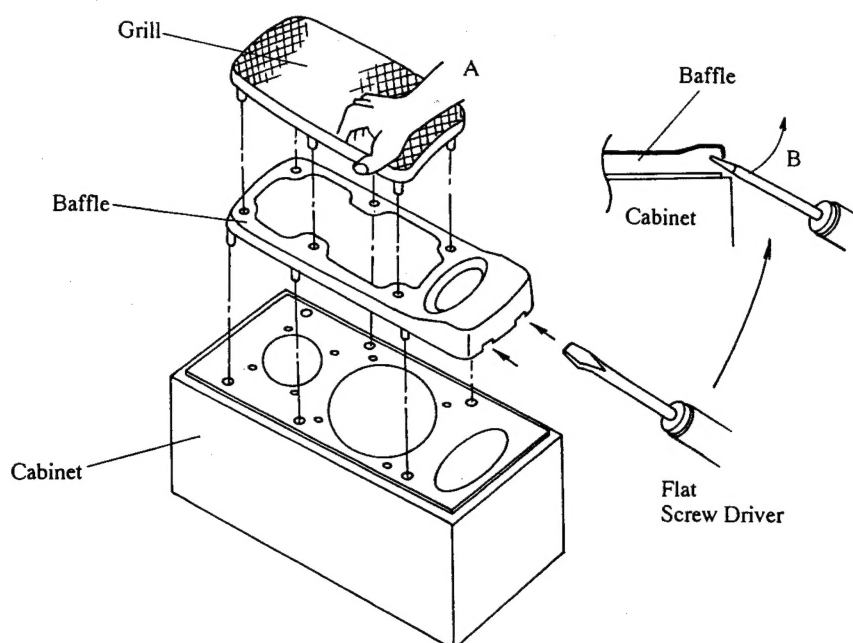
Type:	2 Way, Bass Reflex
Speakers:	15.0 cm, Cone woofer 7.0 cm, Cone tweeter
Frequency Response:	48 ~ 20,000 Hz
Maximum input power:	80 W
Nominal Impedance:	6 ohm
Sound Pressure Level:	89 dB/W/m
Crossover Frequencies:	3,500Hz
Dimensions:	180 (w) × 315 (H) × 240 (D) mm (7-1/16" × 12-3/8" × 9-7/16")
Weight:	3.9 kg (8.6 lbs.)

2. SCHEMATIC DIAGRAM



3. HOW TO REMOVE THE SPEAKER UNIT.

- Grab the frame of the grill strongly, and pull it out.
 - Insert a flat screw driver in the holes at the bottom of the baffle board, and pry it upward.
- If either A or B can be removed, you will be able to take out the speaker unit.



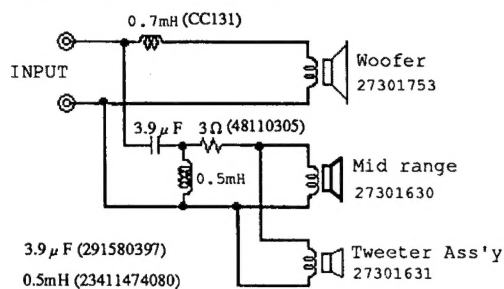
SPEAKER SYSTEM

MODEL PS-31

1. SPECIFICATIONS

Type:	3 Way, Bass reflex
Speakers:	15.0 cm, Cone woofer
	7.0 cm, Cone midrange
	2.0 cm, Dome tweeter
Frequency Response:	40 ~ 20,000 Hz
Maximum input power:	80 W
Nominal Impedance:	6 ohm
Sound Pressure Level:	89 dB/W/m
Crossover Frequencies:	3,500Hz, 10000Hz
Dimensions:	200W×287D×400H mm (7-7/8"×15-3/4"×11-5/16")
Weight:	6.0 kg (13.2 lbs.)

2. SCHEMATIC DIAGRAM



3. HOW TO REMOVE THE SPEAKER UNIT.

1. Pull out 4 catchers.
2. If you unscrew, baffle board can be removed.

